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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/577,748

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Andre Feugier

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EXAMINER

MULLICAN, IAN

ART UNIT

PAPER NUMBER

4122

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/577,748	<b>Applicant(s)</b> FEUGIER ET AL.	
	<b>Examiner</b> IAN MULLICAN	<b>Art Unit</b> 4122	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 18-34 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 18-34 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- ☒ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. ____.                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>04/27/2006</u> .  | 6) <input type="checkbox"/> Other: ____.                          |

### **DETAILED ACTION**

1. The cancellation of claims 1-17 as per the amendments submitted on April 27, 2006 has been acknowledged in the prosecution of this application.

#### ***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 23-25 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. The term "low roughness" in claim 23 is a relative term which renders the claim indefinite. The term is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. The limitation of "roughness" in the claim has been rendered indefinite.

#### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 18, 20-26, and 28-30 are rejected under 35 U.S.C. 102(b) as being anticipated by Hayes (US 4643873).

3. As for claim 18, Hayes teaches in the Abstract and (col. 3, lines 25-49) to (col. 4, lines 1-9) of a process for manufacture of nuclear fuel pellets by obtaining the powder directly by the UF.sub.6 hexafluoride conversion process, placing the powder in a vessel containing moving compressing and mixing bodies, agitating the vessel such that the powder moves within a volume of the vessel in three noncoplanar axes to be compressed between moving bodies and walls of the vessel to form a particulate material having a density in an uncompacted state of at least 1.7 g/cm.sup.3 (possible values for pour and tap densities are both shown to be over 1.7 g/cm.sup.3), and shaping the particulate material obtained by agitation in the vessel into raw fuel pellets that undergo sintering.

4. As for claim 20, Hayes teaches at col. 1, lines 15-18 that UF.sub.6 is reacted with dry steam and then with steam AND/OR hydrogen. Therefore, it would be inherent that the resulting powder have the densities as claimed.

5. With regard to claim 21, since Hayes produces the Uranium dioxide as claimed, the obtained powder from the UF<sub>6</sub> conversion in Hayes would inherently have a density and flowability as claimed based on the standard test.

6. As for claims 22-26, Hayes teaches in (col. 3, lines 34-43) of a process wherein the vessel containing the moving bodies and the powder obtained by a UF.sub.6 hexafluoride conversion process is agitated for a time of 300 minutes, the moving

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compression and mixing bodies in the vessel are free bodies having any simple geometric shape, the moving bodies are substantially spherical beads, and the moving bodies are taught to be steel balls (cylindrical or spherical). The steel balls would inherently have a surface of low roughness.

7. As for claims 28-30, Hayes teaches in (col. 1, lines 48-57) of a process comprising at least one additive being added to the vessel (either before or in a course of treatment) together with uranium dioxide UO<sub>2</sub> powder obtained directly by the UF<sub>6</sub> hexafluoride conversion process.

### ***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. Claims 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hayes (US 4643873) as applied to claims 18, 20-26 and 28-30 above.

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11. Hayes teaches a process for manufacture of nuclear fuel pellets as detailed above.

12. As for claim 19, Hayes does not expressly disclose the vessel being subjected to three-dimensional vibratory movements.

13. It would have been obvious to one of ordinary skill in the art at the time the invention was made that a ball mill as described by Hayes in (col. 3, lines 34-39) can be vibrated. The rationale to do so would have been the motivation to further refine the powder to increase the specific surface area.

14. Claims 27 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hayes (US 4643873) as applied to claim 18, 20-26 and 28-30 above, in view of Butler et al. (US 3995000).

15. Hayes teaches a process for manufacture of nuclear fuel pellets as detailed above.

16. As for claims 27 and 31, Hayes does not expressly disclose at least one additive comprising at least one pore-forming agent in a proportion equal to at least .01% being added to the vessel together with the uranium dioxide  $\text{UO}_2$  powder (before the vessel is agitated) obtained directly by the  $\text{UF}_6$  hexafluoride conversion process, and the additive comprising at least one of uranium oxide  $\text{U}_3\text{O}_8$ , uranium oxide  $\text{U}_3\text{O}_7$ , plutonium oxide  $\text{PuO}_2$ , thorium oxide  $\text{ThO}_2$ , gadolinium oxide  $\text{Gd}_2\text{O}_3$ , pore-forming substance, lubricant, and sintering doping agents.

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17. Butler teaches the use of additives to be added to uranium oxide for the purpose of influencing the density of uranium oxide fuel pellets. The additive used is ammonium oxalate. Butler further teaches that it is advantageous in producing a large range of pore sizes over a wide density range. Further, its presence does not change the sintering characteristics of the nuclear fuel pellet (ease of handling and removing), further, no debonding process is necessary. See col. 1, lines 22-50. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the additive of Butler in the making of nuclear fuel pellets in order to influence the density of uranium oxide fuel pellets. It is advantageous in producing a large range of pore sizes over a wide density range. Further, its presence does not change the sintering characteristics of the nuclear fuel pellet (ease of handling and removing), further, no debonding process is necessary. As clearly taught by Butler.

18. Claims 32 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hayes (US 4643873) as applied to claim 18, 20-26 and 28-30 above, and further in view of Marchand et al. (US 6449034).

19. Hayes teaches a process for manufacture of nuclear fuel pellets as detailed above, further comprising (in col. 3, lines 19-23) mixing the particulate material comprising uranium oxide  $\text{UO}_2$  obtained by agitation of the conversion powder in a presence of moving bodies with the plutonium oxide powder  $\text{PuO}_2$  before shaping of the pellets for the production of mixed uranium oxide plutonium oxide fuel pellets.

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20. Hayes does not expressly disclose the process of claim 18 further comprising placing the vessel in a confinement enclosure, placing the uranium oxide, plutonium oxide powders, and additives in the vessel and agitating the vessel in a manner that is controlled from outside the containment enclosure.

21. Marchand teaches in (col. 5, lines 40-46) of a process well known in the art of using a glove box in the control of nuclear fuel pellets.

22. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the glove box taught by Funke in the process of Hayes.

23. The rationale to do so would have been the motivation to decrease radiation exposure of the operating personnel.

24. Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hayes; (US 4643873) as applied to claim 18 above, in view of Bauer et al. (US 5841200).

25. Hayes teaches a process for manufacture of nuclear fuel pellets as detailed above.

26. Hayes does not expressly disclose adding a lubricant material to the particulate material prior to shaping the pellets by compression of the particulate material obtained by agitation in the vessel, and preparing a soft mixture of the particulate material and the lubricating in order to distribute the lubricating material over the particles of the particulate material.



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27. Bauer teaches in (col. 1, lines 25-48) of a process known in the art for the production of nuclear fuel pellets with a step of adding lubricant to the granules prior to palletizing by compression of the granules.

28. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the lubricating process of Bauer with the process of Hayes.

29. The rationale to do so would have been the motivation provided by Bauer in (col. 4, lines 63-67) to (col. 5, lines 1-4) that adding a lubricant to the powder makes it possible to improve and facilitate to a surprising extent the milling of the powder.

### ***Conclusion***

30. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: Carter et al. (US 5757087). Carter discloses more information about densities in the nuclear fuel pellet production process.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to IAN MULLICAN whose telephone number is (571)270-7656. The examiner can normally be reached on Monday-Friday 7:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Milton Cano can be reached on (571)272-1398. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/I. M./  
Examiner, Art Unit 4122

/Milton I. Cano/  
Supervisory Patent Examiner, Art Unit 4122